# Set 2. Scientific Notation

**Skill 2.01: Be able to present a measurement in scientific notation**
**Skill 2.02: Be able to convert a measurement in scientific notation to normal notation**

## Skill 2.01: Be able to convert a measurement in scientific notation to normal notation

**Skill 2.01 Concepts**

Scientific notation shows only those numbers that are significant in a measurement and therefore removes any ambiguity in the uncertainty.

The general form of a numerical quantity written in scientific notation is:

$A \times 10^{x}$

Consider the following measurement 2000 g

How might you report this number to 2 significant figures?

*Step 1*: First, convert the number to scientific notation. This is done by first moving the decimal to the right of the first number in the measurement.

The measurement 2000 now becomes 2.000. The 2.000 is "A" in the general form.

*Step 2*: Next count how many places you moved the decimal to the left. This number is "x" in the general form.

In scientific notation, this number is therefore $2.000 \times 10^{3}$ g

But this number has 4 significant figures

*Step 3*: The last step is to round to the appropriate significant figures, 2.

$2.0 \times 10^{3}$ g

### Skill 2.01 Example 1

| Report the following measurements using scientific notation to the appropriate significant figures: | | |
|---|---|---|
| (a) 5010000 to 5 significant figures | (b) 79900 to 2 significant figures | (c) 0.0000999 to 2 significant figures |

## Skill 2.02: Be able to convert a measurement in scientific notation to normal notation

**Skill 2.02 Concepts**

To convert a number in scientific notation to normal notation from the general format, you can move the decimal point in A to the right x places, if x is a positive integer, or to the left x places, if x is a negative integer.

For example,

For the number $1.23 \times 10^2$

If 1.23 is "A" and 2 is "x", you would move the decimal two places to the right since 2 is a positive integer.

The number $1.23 \times 10^2$ could therefore be written as 123

On the other hand,

For the number $1.23 \times 10^{-2}$

If 1.23 is "A" and -2 is "x", you would move the decimal two places to the left since 2 is a negative integer.

The number $1.23 \times 10^{-2}$ could therefore be written as 0.0123

**Skill 2.**02 Example 1

| For each number (a) Identify the number of significant figures (b) Convert to normal notation. | |
|---|---|
| (i) $1.23 \times 10^3$ | (ii) $37.000 \times 10^{-5}$ |

**Set 2.0 Practice Problems**

1. For each measurement (i) identify the number of significant figures, (ii) convert to normal notation

   (a) $5.60 \times 10^1$ kg
   (b) $2.5 \times 10^{-4}$ m
   (c) $5.600 \times 10^6$ miles
   (d) $0.02 \times 10^2$ feet
   (e) $3.00 \times 10^{-2}$ feet
   (f) $7.020000 \times 10^9$ g
   (g) $5 \times 10^3$ g

2. For each measurement (i) convert to scientific notation (ii) round to the number of significant figures indicated

   (a) 2260 mm to 3 significant figures
   (b) 226.0 g to 4 significant figures
   (c) 0.00000000050 to 1 significant figure
   (d) 0.30 to 1 significant figure
   (e) 90000067 to 2 significant figures
   (f) 90701 to 2 significant figures
   (g) 789 to 1 significant figure